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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314				
EXAMINER				
DOUGLAS, JOHN CHRISTOPHER				
ART UNIT		PAPER NUMBER		
1797				
NOTIFICATION DATE		DELIVERY MODE		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/521,364

Applicant(s)

ADRIAN ET AL.

Examiner

JOHN C. DOUGLAS

Art Unit

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 December 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

Response to Amendment

Examiner acknowledges the amendment filed on 12/21/2007 containing remarks and amendments to the claims. The 112 rejection is overcome by amendment. The 103(a) rejection is maintained, with minor modifications:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 17-26 and 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meyer (US 2003/0181772).
2. Applicant has provided evidence in this file showing that the invention was owned by, or subject to an obligation of assignment to, the same entity as Meyer (US 2003/0181772) at the time this invention was made, or was subject to a joint research agreement at the time this invention was made. However, reference Meyer (US 2003/0181772) additionally qualifies as prior art under another subsection of 35 U.S.C. 102, and therefore, is not disqualified as prior art under 35 U.S.C. 103(c).

Applicant may overcome the applied art either by a showing under 37 CFR 1.132 that the invention disclosed therein was derived from the invention of this application, and is therefore, not the invention "by another," or by antedating the applied art under 37 CFR 1.131.

1. With respect to claims 17-20, 22 and 34, Meyer discloses an extractive distillation process comprising Feeding a C4 fraction to a column having a vertical dividing wall, forming a first region, a second region, and a lower combined column region; where the C4 fraction is contacted with a N-methylpyrrolidone solvent; where the where C4 feed is fed into the first region; the stream containing butanes and the stream containing butenes is taken off at the top of the column; and where the solvent laden with

butadienes is taken off at the bottom. The disclosure of the dividing wall in a C4 separation process is described as a known process in Meyer. See Meyer, Paragraphs, 6, 7, 23 and 24 and Figure 1.

2. With respect to claims 21 and 33, Meyer discloses that at least two thermally coupled columns can accomplish a similar result as a dividing wall (see Meyer, paragraph 8).
3. With respect to claim 34, Meyer discloses that the N-methylpyrrolidone is useful in an aqueous solution (see Meyer, paragraph 25).
4. With respect to claims 23 and 35, Meyer discloses an example where a column having a total of 70 theoretical plates is used (see Meyer, paragraph 85).
5. With respect to claim 24, Meyer discloses where the butadiene stream is sent to a selective hydrogenation step (see Meyer, claim 1).
6. With respect to claim 25, Meyer discloses distilling the crude butadiene stream to obtain pure 1,3-butadiene (see Meyer, claim 1). Meyer does not disclose the composition of the top stream. However, it would have been obvious to include where a top stream comprises propyne, because propyne is present in the C4 feed (see Meyer, paragraph 1) and in a distillation, the C3 (propyne) would remove further up the column than the C4 butadiene.
7. With respect to claims 26, Meyer discloses where a stream is taken off the top and also subjected to the catalytically active zone (see Meyer, claim 5).

8. Claims 27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meyer in view of Dorbon (US 6137023). Meyer does not disclose the hydroisomerization of the butene stream.

However, Dorbon discloses where a C4 stream containing butene-1 and butene-2 are sent to a hydroisomerization zone to convert the butene-1 to butene-2, the butene-2 compounds are then sent to a skeletal isomerization zone to obtain isobutene (see Dorbon claim 1). Dorbon discloses that such a process achieves high purity isobutene (see Dorbon, column 1, lines 7-10).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to modify the process of Meyer to include where a C4 stream containing butene-1 and butene-2 are sent to a hydroisomerization zone to convert the butene-1 to butene-2, the butene-2 compounds are then sent to a skeletal isomerization zone to obtain isobutene in order to obtain high purity isobutene

9. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Meyer in view of Paludetto (US 5563299). Meyer does not disclose subjecting the butenes to etherification.

However, Paludetto discloses where a stream comprising butenes is sent to a selective etherification to produce an ether and separating the remaining compounds to sent to an isomerization zone to obtain isobutene (see Paludetto, column 2, lines 38-59).

Paludetto discloses that such a process allows for the recovery of the remaining olefins to a isomerization unit so that isobutene can be recycled (see Paludetto, column 2, lines 20-37).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the process of Meyer to include where a stream comprising butenes is sent to a selective etherification to produce an ether and separating the remaining compounds to sent to an isomerization zone to obtain isobutene because such a process avoids the waste of C4 olefins.

Allowable Subject Matter

10. Claims 30-32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter: The prior art does not teach or disclose fractionating a C4 fraction by extractive distillation to obtain an isobutene fraction that is sent to skeletal isomerization to obtain a stream that is predominantly 1-butene and 2-butene. The prior art also does not teach or disclose fractionating a C4 fraction by extractive distillation to obtain an isobutene fraction that is processed by selective dimerization to achieve a stream comprising C8 hydrocarbons and 1-butene and 2-butene.

Response to Arguments

Applicant first argues that Meyer discloses that both butanes and butenes are removed from a single top stream, while the invention comprises one top stream comprising butanes and a top stream comprising butenes obtained from a dividing wall that extends into the upper column region as opposed to Meyer, which has a common upper column region. However, the claims state that the first stream comprises butanes and the second stream comprises butenes. Meyer's top stream reads on each of Applicant's top streams because the Meyer's stream comprises butanes and it can also be said that Meyer's stream comprises butenes. Therefore, first stream's contents reads on Meyer's top stream contents and the second stream's contents reads on Meyer's top stream contents. The difference between Meyer and the claimed invention is that Meyer discloses one stream and the Applicant discloses 2 of Meyer's one stream. According to *In re Harza*, 124 USPQ 378 (CCPA 1960), mere duplication of parts has no patentable significance unless a new and unexpected result is produced (see MPEP 2144.04 VI.B.). In this case, the claims of the current invention, as written, merely duplicate the top stream of Meyer. Thus, according to the MPEP, such a limitation has no patentable significance.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHN C. DOUGLAS whose telephone number is (571)272-1087. The examiner can normally be reached on 7:30 A.M. to 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. C. D./
Examiner, Art Unit 1797

3/17/2008
/Glenn A Caldarola/
Acting SPE of Art Unit 1797